

IN THE CLAIMS

We claim:

1. A method of coating a surface of a substrate with a polymer solution, comprising:
 - providing the substrate; and
 - dispensing the polymer solution onto the surface of the substrate using a coating system having a pump connected in-line with a buffer tank and a polymer solution source, the pump to draw the polymer solution from the polymer solution source and the buffer tank in a continuous fluid path to dispense the polymer solution, the polymer solution source being connected to a pressure source capable of causing the polymer solution to be transferred from the polymer solution source into the buffer tank, the buffer tank to maintain a relatively constant level of polymer solution.
2. The method of claim 1 further comprises rotating the substrate to spread the polymer solution.
3. The method of claim 1 further comprises evaporating solvent from the polymer solution dispensed on the surface of the substrate to form a polymer layer on the surface of the substrate.
4. The method of claim 1 wherein the polymer solution is a photoresist solution.
5. The method of claim 1 further comprising:
 - mounting the substrate on a rotatable chuck

6. The method of claim 1 further comprising:
 - applying a pressure to the polymer solution source to transfer the polymer solution into the buffer tank.
7. The method of claim 6 further comprising:
 - coupling a pressure source to the polymer solution source;
 - providing a momentary valve between the pressure source and the polymer solution source, the momentary valve to allow pressure to be applied to the polymer solution source, wherein a controlled activation of the momentary valve is needed to allow pressure to be applied to the polymer solution source.
8. The method of claim 6 wherein pressure is applied to the polymer solution source from a pressure source and wherein a momentary valve is used to manually apply pressure to the polymer solution source for a predetermined amount of time.
9. The method of claim 6 further comprises flowing an inert gas into the polymer solution source to create the pressure to transfer the polymer solution into the buffer tank.
10. The method of claim 1 wherein an enable valve is placed between the buffer tank and the pump wherein opening the enable valve allows the polymer solution to flow to the pump, wherein a fluid sensor is coupled to the polymer solution source, the fluid sensor configured to detect the polymer solution level in the polymer solution source, and wherein the sensor is capable of shutting off the enable valve when the polymer solution level in the polymer solution source is detected to be substantially low or empty.

11. The method of claim 10 wherein the pump is connected in-line with at least a second buffer tank and a second polymer solution source, wherein a second enable valve is placed between the second buffer tank and the pump wherein opening of the second enable valve allows the polymer solution to flow to the pump, wherein a second fluid sensor is coupled to the second polymer solution source, the second fluid sensor configured to detect the polymer solution level in the second polymer solution source, and wherein the second sensor is capable of shutting off the second enable valve when the polymer solution level in the second polymer solution source is detected to be substantially low or empty.
12. The method of claim 11 each of the first sensor and the second sensor is capable of switching pumping direction of the pump away from an empty or substantially low polymer solution source.
13. A polymer solution coating system comprising:
 - a substrate station to support a substrate;
 - a pump to dispense a polymer solution over a surface of the substrate;
 - a buffer tank and a polymer solution source connected in-line with the pump wherein the buffer tank is connected between the polymer solution source and the pump, the pump configured to draw the polymer solution from the polymer solution source and the buffer tank in a continuous fluid path, the buffer tank to maintain a relatively constant level of polymer solution; and
 - a momentary valve to control pressure applied to the polymer solution source to transfer polymer solution into the buffer tank, wherein the pressure is only applied for a predetermined amount of time.

14. The system of claim 13 wherein the momentary valve requires an operator to push down on the momentary valve to allow pressure to flow into the polymer solution source.
15. The system of claim 13 further comprises an enable valve placed between the buffer tank and the pump wherein opening the enable valve allows the polymer solution to flow to the pump, wherein a fluid sensor is coupled to the polymer solution source, the fluid sensor configured to detect the polymer solution level in the polymer solution source, and wherein the sensor is capable of shutting off the enable valve when the polymer solution level in the polymer solution source is detected to be substantially low or empty.
16. The system of claim 15 further comprises at least one second buffer tank and one second polymer solution source connected in-line with the pump.
17. The system of claim 16 further comprises a second enable valve and a second sensor, the second enable valve is placed between the second buffer tank and the pump wherein opening of the second enable valve allows the polymer solution to flow to the pump, the second fluid sensor is coupled to the second polymer solution source, the second fluid sensor configured to detect the polymer solution level in the second polymer solution source, and wherein the second sensor is capable of shutting off the second enable valve when the polymer solution level in the second polymer solution source is detected to be substantially low or empty.

18. The system of claim 16 wherein each of the enable valve and the second enable valve is capable of switching the pumping direction of the pump away from an empty or substantially low polymer solution source.
19. The system of claim 13 wherein the polymer solution is a photoresist polymer.
20. The system of claim 13 wherein the substrate station is placed on a rotatable chuck.
21. The system of claim 13 wherein a pressure is applied to the polymer solution source to transfer the polymer solution into the buffer tank.
22. The system of claim 21 wherein an inert gas is flown into the polymer solution source to create the pressure.
23. A method of coating a surface of a substrate with a polymer solution, comprising:
 - securing a substrate on a rotatable substrate station;
 - dispensing the polymer solution onto the surface of the substrate using a pump, wherein dispensing the polymer solution further comprises,
 - drawing a polymer solution using a coating system having a pump being connected in-line with a buffer tank and a polymer solution source, the pump drawing the polymer solution from the polymer solution source and the buffer tank in a continuous fluid path to dispense the polymer solution on the surface of the substrate, and
 - maintaining a constant level of polymer solution in the buffer tank; and
 - spinning the substrate to coat the dispensed polymer solution over the surface.

24. The method of claim 23 further comprises applying an inert gas into the polymer solution source by pressing down on a momentary valve coupled to the polymer solution source to transfer a sufficient amount of polymer solution into the buffer tank to prevent the pump from drawing air, the momentary valve requiring a manual activation to apply the inert gas to the polymer solution source.

25. The method of claim 23 further comprising:

connecting a first buffer tank and a first polymer solution source in-line with the pump wherein the first buffer tank is connected between the first polymer solution source and the pump;

connecting a second buffer tank and a second polymer solution source in-line with the pump wherein the second buffer tank is connected between the second polymer solution source and the pump;

providing a sensor to sense the polymer solution level for each of the first polymer solution source and the second polymer solution source;

providing an enable valve being communicative with the sensor and the pump, the enable valve being able to direct the pump away from an empty polymer solution source.

26. The method of claim 23 further comprises rotating the substrate to spread the polymer solution.

27. The method of claim 23 further comprises evaporating solvent from the polymer solution dispensed on the surface of the substrate to form polymer layer on the surface of the substrate.